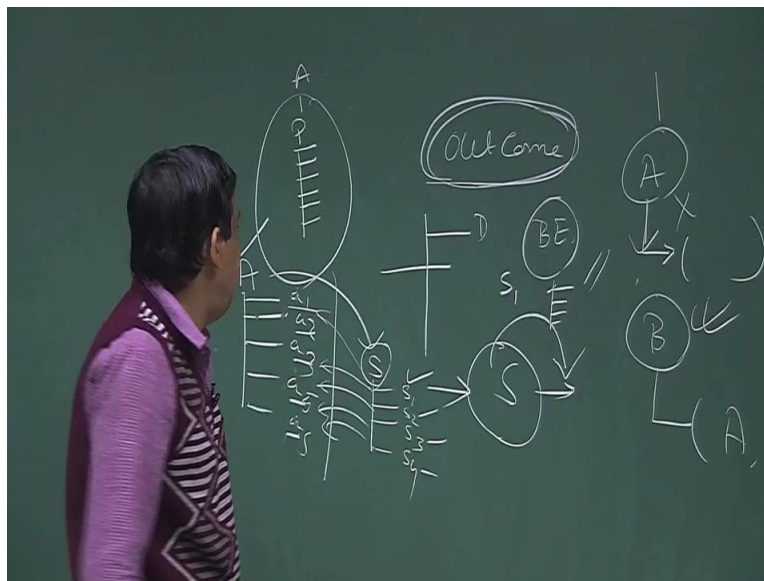


Outcome based Pedagogic Principles for Effective Teaching
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Lecture 03
Outcome based Learning

Okay so in the last class we shared that accreditation okay and graduate attributes which is required for mainly the graduate attributes that for engineering education graduate four year program graduate attributes, Washington accords and NBA guidelines.

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If you see all this Washington accords and NBA guidelines said that outcome, outcome means it is not that okay some student say sir I have attended a course on analog electronics and I got x but I do not know how to design a push pull amplifier. That is there but I only know I describe teacher said me only description will come in the question paper so I only studied the description.

Then in there your Washington accords or your NBA requirements is followed because none of that accreditation boards or the mini (1:25) we define the minimum quality required for a graduate engineer all ways in term of skill not in terms of knowledge. Knowledge means remembering not job. So that means I cannot say as graduate engineer I should have the capability of engineering design. I should have the capability of problem solving.

I should have the skill or capability for design of experiment for analyze the data for interpreted that analysis all kinds of skill set not the problems and that's are the outcome. So unless we know what is outcome based learning how can I say that yes I will write that my curriculum which is NBA accredited or I will follow a teaching leaning process who will guaranteed that Washington accords requirement.

So that means I have to think what do mean by outcome base learning and in first lecture I have said in twenty first century student require skill set. If you see that purpose of the education is to develop the skill means what I have learned or what whatever theory what about the practical or what about the teaching learning process I go through. At the end I am developing certain skill on myself so that I can say I am educated because I have this certain skill.

If you say what is difference between a common people and let I am BE engineer in electronics or B.Tech engineer is in electronics. Somebody ask me what is the difference between you and me. I have to differentiate some skill set yes you does not have this skill set, I have this skill set that's why I am BE engineer. Not that I have only a certificate I am BE engineer.

So that means whatever I learn that should be a outcome. Learning is the process for acquiring the skill. Learning is the process for acquiring the skill. Skill is the outcome so any human being nature of the human beings I do something if there is an outcome.

If I somebody said go to Kharagpur station, I will not go. If there is some need, some requirement or some outcome then only I can go to Kharagpur station. So I can say outcome based learning that means I want to develop the skill S1 that's why I admitted this or I take this course.

Many students I have asked in here also. Why you have attend this course? Or what is the expectation that this course will offer you? They said sir only grade. If this is the outcome then the purpose of the education is totally loss. I am attending a course or I am attending a program to develop certain skill which I does not and after that over I attend this program I have this skill.

So outcome base leaning said that suppose I have a program A is a program. If this program said at the end of the program all the leaner must have this skill a1, a2, a3, a4, a5, a6. Those are the skill. Learner have those skill. Now once I define for the program A a learner said that I have

completed successfully program A. when I can say the skill a1, a2, a3, a4, a5 I am acquire, similarly broad down in just break down it in course label.

So program A content a course S and that course is develop certain skill which is s1, s2, s3, s4 and that skill match with this program skill map with this program skill. So that means course developing the skill s1, s2, s3, s4 which are the outcome. So I have attend this course because I want to develop this skill not that I have to get certificate of X A eighty percent, ninety percent.

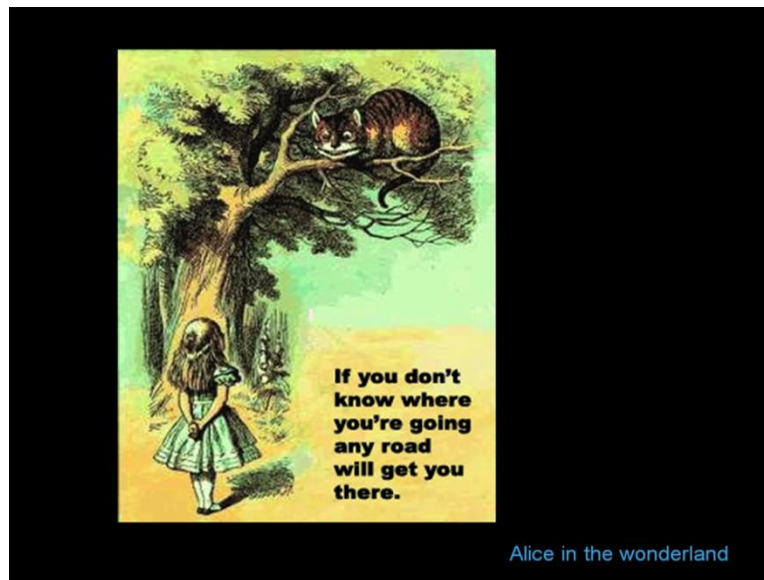
So I want to develop this skill that's why I attend this course. I want develop this skill that's why I attend this program. It is unfortunate the learner today in scenario before a student admitted in program he does not know the expectation. If you ask any parent why you admitted your kid in this program? His said earlier JE rank this got this institute this program so this year my my child got rank rank similar to this. So my child also go to the same institute same program.

None one it is mention that institute A program P if we attend this program then he will develop this skill, it is not mention so parent also not aware about, student also not aware about. After he attend this Course he found I am B.Tech electronics engineer but I don't like this ultimately he get a certificate and get a job. So ultimate aim is that okay get a certificate and get a job not that develop the skill. So outcome based learning says that you should mention that this program, develop this skill once a student enter the program and in the exit student acquire that skill.

That is the program gain. A program force the student to acquire that skill. I give simple example suppose I am admitted in a driving school. Am I happy with the knowing how the glass working? How the gear working? How the accelerator working? Or I want that the end of the driving school I should able to drive a four wheeler if it is a four wheeler driving school for specific road condition this kind road. So suppose school A said that if you come to my school I will at the end of the program you should able to drive a car in Calcutta city.

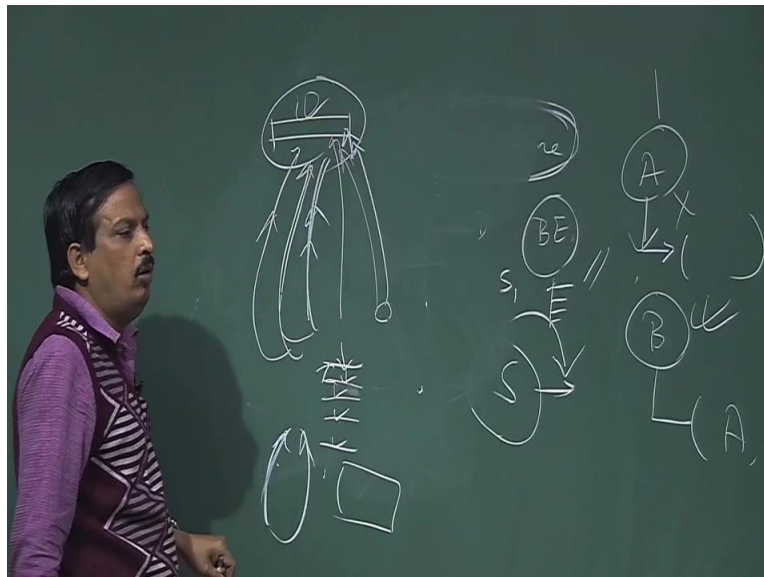
And school B said if you come to my school you will be able to drive a car in highway and Calcutta city. Then it is a learner choice which school he will go. So I A school I do not see that this is not important so I go to the school B so outcome base learning is that you have define, what is the learning goal?

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I just explain in a simple picture. Taken taken from the Alice in the wonderland everybody know that everybody know the story also that the story is very simple. There is a girl standing on junction of some road and she ask the cat which road I should take? Then cat asked where you want to go? Girl said I do not know then cat said anything any road.

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So that means unless I am not defining the outcome how do I define which learning process, which learning methodology, which book, which material I should follow to attend this outcome

okay. I will teach a subject, I will deliver some lectures. All students is come in my class. The somebody take note, somebody does not take note, they practices from the previous year question paper and it is university said that whatever you taught some question must be come from your lecture material, some question must be solved in the class, I give that student pass.

Is any skill is develop? Am I increasing the self-learning ability? So that means as a teacher I should define the goal and the path to reach the goal that is the role role of teachers and test whether a learner reach the specific goal or not? Now reaching the goal is the learner responsibility. Whether the learner is able to reach the goal is the learner responsibility, but I said that suppose if you come to my course those are the course goal, A B C D those of the material, those of the test title is available if a those of the material means those of the path to reach this goal.

Whether you are able to reach this goal or not that is your responsibility, at the end I will test which goal you have reached and which goal you does not. So the purpose of the evaluation only test the confidence of the learner whether he acquired the intended skill or not?

So role of the teachers is change, now what is role of the teachers? Role of the teachers is to define the goal, provide the path, test whether a student reach this goal or not and guide the student for overall, guide the student to reach the goal.

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IT'S NOT WHAT Teacher **TEACH,
IT'S WHAT Learner **LEARN****

*Role of a Teacher is guide
and mentor the student*
→ learner-centric approach

So the role of the teachers become guide or mentor instead of teaching the student. So learning is the learner responsibility, so whole outcome base learning is called learner centric approach. I want to learn that is why I come to this course, nobody force me, I cannot force anybody to learn something.

So he, he want to learn something that's why come in this course and I said if you want to learn something or if you if you said that you are capable or you may confidence in this course then those of the goal you have to achieve those of the skill, you have to acquired and those of the material available those of the problem available by which you can test, whether you reach the goal or not?

And you practice it and reach there. I am available only for guide you, mentor you to reach the goal, not spoon feeding the student to teach the subject, take the test and assign them grade A, grade B, grade C. So in a outcome based learning the role of the teacher change to instead of teaching mentor and guide.

If this role of the teacher is change then student self-learning ability is already promoted because as I teacher I am no more not providing the ready material to them whether they just study before the semester two day they study and give the exam and after exam everything is forgot.

I say in my course you cannot attend or you cannot pass the course or you cannot say that I am clear the course unless you have developed the skill A, B, C, D, E and my question for evaluation method only test whether the learner has acquire that skill or not? So outcome based learning if I follow then I can say I am scattered to 21 century education, I am scattered to domain dependent requirement, domain independent requirement of the Washington accords and NBA guideline. I am scattered to capability building among the student so it increase the student engagement.

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Outcome-based Learning

- OBE is an educational process that focuses on what students can do or the qualities they should develop after they are taught.
- OBE involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of high order learning and mastery rather than accumulation of course credits.
- Both structures and curricula are designed to achieve those **capabilities** or **qualities**.
- Discourages traditional education approaches based on direct instruction of facts and standard methods.
- It requires that the students demonstrate that they have learnt the required skills and content → **encourage self learning**.

OBE addresses the following key questions:

- ❖ *What do you want the students to have or able to do? (skillset)*
- ❖ *How can you best help students achieve it? (Guide)*
- ❖ *How will you know what they have achieved it? (Evaluation)*
- ❖ *How do you close the loop (How Evaluation system reinforce the teaching and learning)*

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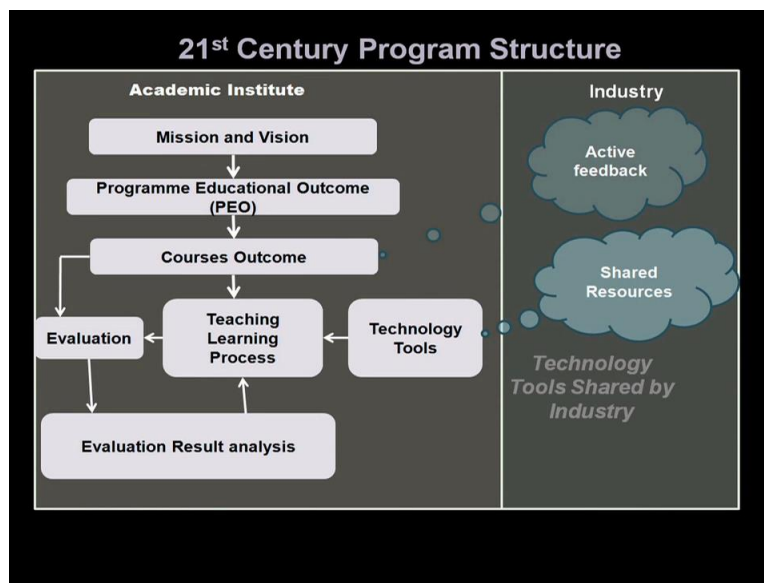
Okay so outcome based learning I am not going to the all the slide, it is there you can see address the following questions. One is what do you want the student to have able to do? That is skill set. How can you best help student to achieve it? That is guide. How will you know that they have achieved it? Evaluation. How do you close the loop? How evaluation system reinforce the teaching and learning?

Once I define the outcome and in evaluation I said only student may most of the student only achieve the skill A and skill B but none of the student is achieve the skill C, then I have to revisit

the teaching learning process and also the outcome. May be this outcome is not achievable or the teaching learning process which I am followed may not scatter to this outcome.

So outcome based education clearly said that learning is the learner responsibility, teacher is only for there to guide and mentor and remove the miss conception happening in the student. If I do that then its promote the self-learning ability, soft skill building and it scatter to the domain independent parameters of Washington accords and NBA guide. So this is outcome based learning. I am not again going all those things.

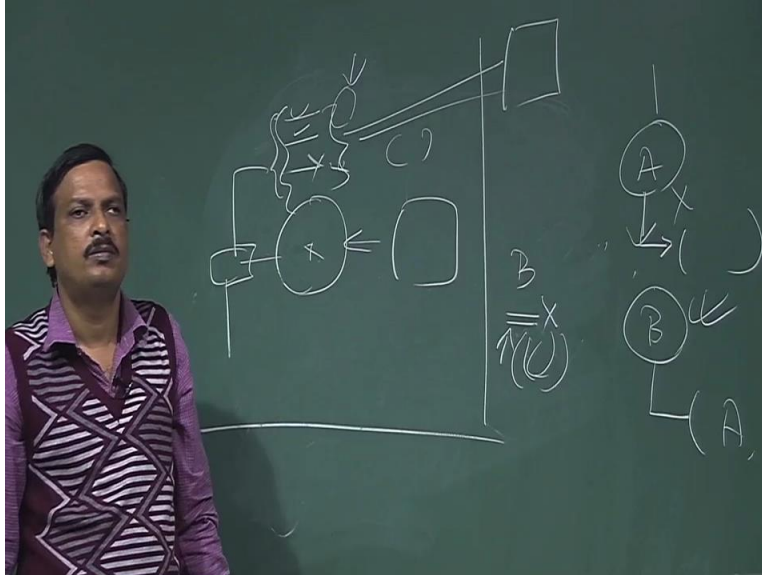
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So if you this slides here we have explaining the program structure. What should the overall program structure which promote the twenty first century education and which create the skill set. Skill set among the students which is required by the twenty first century education. So what is that there is mission vision statement there is program educational outcome.

I am not going details of individual block I will come then later on while the design of the curriculum and just explaining from the course outcome to teaching learning process because the purpose of this course is to effective teaching not for the accreditation, NBA accreditation watching the course. I shared the purpose for this course to how teach effectively. What kind of teaching learning process I should use for effective teaching.

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So this structure, what is define? Course outcome I am explaining for the course. Course outcome structure define the course outcome course outcome is define then I follow a teaching learning process then I said teaching learning process which includes the modern tools and usage and I take the evaluation based on the whether a student achieve this outcome or not? That is evaluation and I resign analyze the evaluation result.

If some of the outcome is not achieve by anyone of the students then I have to change the teaching learning process or the outcome. Now there is angular dimension of this. If I write down my curriculum or course in a outcome based manner then what I am doing. Once I write down write down my course outcome in a specific skill set manner or outcome based manner then and there if I share it with the industry, industry will say these kinds of skill absolute in nature so this may not require please change to this kind of skill.

So as a teacher I get active feedback from the industry that this kind of skill set, suppose still I am I am teaching the basic electronics course and one of the outcome I said that operation principle of the diode (())(20:51) diode or draw the VI characteristics of the (())(20:54) diode then industry said why you will teach this thing. This kind of thing is absolute in nature so it this thing. I get feedback from industry.

Then my curriculum I can continuously revise my curriculum so industry academy collaboration unless we define what kind of skill set we want to develop among the students. How the industry

will comment? Once I said my outcome is this said one of the outcome lets I write that they should able to simulate this kind model using this software.

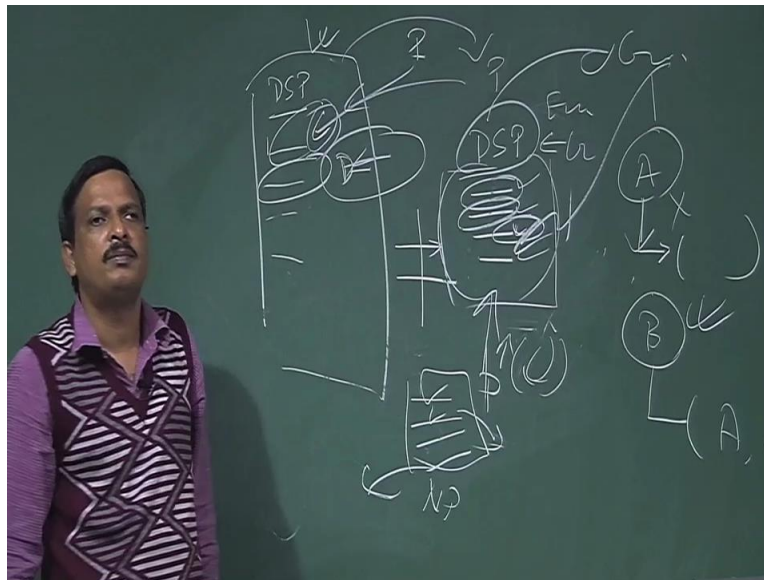
May be this specific software is not available in my institute. That is the modern tools and tools and resource tools and technology and tools. That technology is not available in my institute then industry can said yes this tech this tools is very much useful and here is the open source version or here is the share version you can give it your students to develop the confidence on this tool. So that I can hire them after they complete their study.

Or suppose I am explaining a concept one of the outcome is lets I have I thought subject or power plant engineering and where I teaching that the design of the that say let's design of turbine. Simple turbine I am teaching here but I do not know actual I do not have any actual turbine picture then if this is shared to the industry then industry person can say let's this are the resources this are the pictures of turbine and those are the design issues in turbine area. So you can discussing those issue in class.

Problem, suddenly we are unable to provide all kinds of problem to the students. Now if it is a collaborative environment lets that outcome a can be tested by a problem t, as a teacher I define, somebody else can say instead of t lets use the t1 which test better that this skill. But industry say use this case study for test whether they have this skill or not.

So active collaboration between the industry and academia only possible if I write my curriculum in outcome based manner. If you say today syllabus is use, if you see the syllabus today syllabus what what the syllabus mention? What are that advantage in syllabus and outcome based curricula?

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For the example suppose if you look at the syllabus for DSP for a particular institute it is written A, B, C, D filter, frequency response, LTI response, LTI discrete structure of the LTI system, all kind of list of topics are there in the syllabus.

Suppose today I am teaching this course and I am very good in DSP. I covered every topics in depth whatever require for BE engineer but tomorrow another person is come he may be very good in frequency domain representation but very we can filter design. So today what will happen? Most of the time the teacher will spend on the frequency domain representation, he spend less time in filter design because he does not define the depth, what kinds of filter you have to completed? How much you have to how much confidence you have to develop? It is only the list of topic.

So it is based on the teacher I can know how much depth I will go based on my knowledge. Now what will the happen? The student should follow this DSP course (25:18) this. They will lack of knowledge in this filter design when you go for the image processing class he does not know anything about the filter design. So they face the problem.

Now once you define that DSP for electrical engineering those are the outcome is required then anyone teacher so once the outcome is define learner knows that if I say I am confidence in DSP I should able to do this skill this skill this skill this skill does not depend on the teacher.

May be teacher a not provide the material to develop the skill for this next third skill then then and there he can search in the Google and find out how to develop the (())(26:12) skill. So it is a collaborative teaching environment. A new teacher joined here. He does not know what to taught in DSP. Once this curriculum is available he know I have to develop this skill this skill this skill among the students. Those are the reference material already available those kind of test item used for test a skill. Those material is available and those are continuously upgraded by the industry.

Now teacher is only is guide and mentor to the student to achieve this. So the shortage of quality teacher, can we solve? Using outcome based curriculum design. So teaching not overall the teaching is varies from teacher, to teacher because learner knows how to develop the skill A, B, C, D it is his responsibility whether he develop those skill from the teacher, class teacher or from the Google, from the MIT open course, from the NPTEL open course NPTEL video does not matter.

Once I define this skill it is a done. Similarly one issue, one more issue I have to explain that lets the grade transfer. Some were credit transfer. Somebody said that yes credit transfer I will if you do this course in this institute that credit will be transfer. Presently it is based on what?

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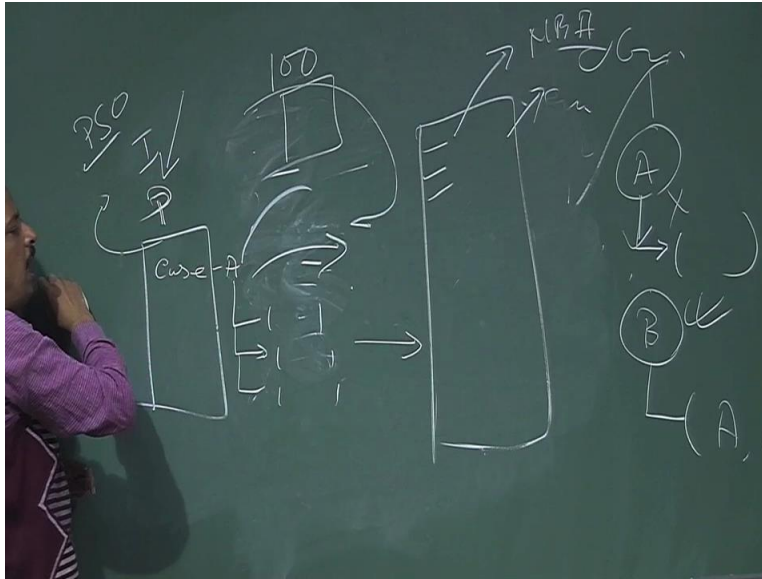
It is based on the reputation of the institute, reputation of the examination system. Why it will base on the reputation? Suppose I defining my course structure course lets the thermodynamics teaching by institute A define his outcome at the end of the thermodynamic course student will able to do this one this one this open this one and my evaluation process only test whether they have that skill or not valid skill or not.

If this evaluation process is a valid process then whatever the grades students get lets A can be directly transfer to any institute because if I am institute B looking for the same set of skill in thermodynamics then I can say if you completed the course this course your credit will be transfer here.

I will not looking for the reputation of the institute. I am not looking for the educational examination process. What is the question paper? I am not looking. I said those of the skill set require for the, I will want to develop thermodynamics and a student had develop all the skill. Now a program B, institute B, program C want the same set of skill skill then I can say if you complete this course come to here does not require that reputation, does not require that something else has to be done.

Once fine morning somebody said yes IIT grade can be compatible to everybody, does not required. It is based on the skill only. So defining the, designing the outcome base curriculum for every course, for every program is the key issue once I done that grade task, credit task for industry sharing continuous improvement of the curriculum and designing of the curriculum also very easy.

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Today if you see when somebody syllabus committee, syllabus committee some expert sit and three your four expert sit together and define a syllabus. Syllabus for BE or instrumentation engineering this course this this course must be there, this course must be there somebody some expert expert may come from microwave, he said all the topic of the microwave is very important. So he is listed down all the microwave topic.

Somebody is come from the industrial instrumentation he said all the topic of industrial instrumentation is important. He listed down all that topic. So the huge syllabus is there but does not guaranteed whether that syllabus is achievable by this four year program or not. Whether this whole syllabus are scatter to the NBA requirement or Washington attributes or not, does not?

But think if the same same thing, same every subject design based on the outcome based curriculum and is openly available in the net lets there is one thousand subject is available, two thousand subject or every there is a lot of varieties of basic electronic, lot of varieties of electrical engineering, basic electrical engineering, lot of varieties of electrical measurement.

All courses are available develop by the different teachers or outcome based curriculum is available I am designing a program, I can pick any one of the outcome, I can pick the outcome I am designing a lets I am designing a institute I designing a program P for the course let I define

A and I can search for that what kind of skill I want in the course A, I can define or I can search from the thousands of courses and define the skill.

Then I can define the PSO matrix from the (())(32:26). So now my syllabus whatever the syllabus I prepared a scientifically validated but the all outcomes are achievable in nature and all outcome scatter to PSO which is PO of NBA or Washington accords and a learner it is available to the learner, learner know if I want to becomes a successful graduate from this program I have to acquire all this skill which is mention in the curriculum not the list of topic.

Today if you ask any student, fourth year students what are the subject you study in the last three year. He is unable to name all the subject. Unable to name all the subject name itself skill because again syllabus is available teacher, teach something deliver it is, student take a note student know that question what should the question next semester. Just read ten days before the exam, give the exam. Get X grade graduate.

No skill nothing. This is the requirement this is the outcome based education advantage. How to design this course curriculum? How to design this this kind of frame work? I will explain in the next lecture okay.